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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,744	12/16/2003	Norio Taniguchi	36856.1181	3343

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EXAMINER

SUMMONS, BARBARA

ART UNIT	PAPER NUMBER
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2817

DATE MAILED: 04/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,744

Applicant(s)

TANIGUCHI, NORIO

Examiner

Barbara Summons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-11 is/are rejected.
- 7) ☒ Claim(s) 2-4 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/16/03
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Objections

1. Claim 5 is objected to under 37 CFR § 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 5 recites only that the resonant frequency of the first series arm resonator "is different from" the resonant frequency of the second series arm resonator, but this has already been recited in the parent claim which recites that the resonant frequency of the first series arm resonator is less than, and therefore necessarily "different from", the resonant frequency of the second series arm resonator (see claim 1, the last three lines thereof).

2. Claims 7 and 8 are objected to because of the following informalities:

Each of claims 7 and 8 recite a single resonator on line 1. However, there are multiple resonators in the filter as previously recited (see e.g. claim 1, lines 1-2).

Therefore, the Examiner suggests in each of claims 7 and 8, on line 1 thereof, changing "the resonator" to - - each resonator - -.

Also, in claim 7, on line 3, one of "electrodes" or "transducers" should be deleted as redundant.

Also, in claim 8, on line 3, "recess" should be followed by a comma - - , - - and "film" should be followed by a comma.

And finally, in claim 8, on line 4, "recess" should be followed by a comma -- , -- since this will make it clear that it is the "piezoelectric thin film" that is "sandwiched".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 5-7 and 9-11 are rejected under 35 U.S.C. § 102(b) as being anticipated by Hickernell U.S. 6,201,457.

Regarding claims 1 and 7, Fig. 6 of Hickernell discloses a surface acoustic wave (SAW) ladder filter with SAW interdigital transducers (see col. 6, lines 40-43) comprising four series arm SAW resonators including the series arm resonator 102 of the notch filter 100 (see col. 6, lines 1-6) and three parallel arm SAW resonators; wherein the series and parallel arm resonators are alternately connected to each other thus forming a ladder filter; each of the series arm resonators is a first series arm resonator connected in parallel to an inductor or a second series arm resonator not connected to an inductor, that is resonator 102 is a first series arm resonator connected in parallel with an inductor 104 (see col. 5, lines 2-5) and the remaining three series arm resonators are second series arm resonators not connected to an inductor; and wherein the resonant frequency of the first series arm resonator is $f_{sr1} = 854.56$ (MHz)[as seen

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in Fig. 6] and is less than the average resonant frequency of the second series arm resonators, as $fsr2$ is defined in Applicant's specification (see the last full paragraph on page 5), such that $fsr2 = (883.05 + 882.29 + 879.46) / 3 = 881.6$ MHz, and $854.56 < 881.6$ so that $fsr1 < fsr2$ is satisfied.

Regarding claim 5, $fsr1$ is different from $fsr2$ since they are not equal. Regarding claim 6, the filter further comprises a package 122 (Fig. 8), and the inductor 104 is arranged in the package (see col. 6, lines 57-59 and col. 7, lines 1-3). Regarding claims 9-11, see the communication apparatus of Fig. 9, wherein the filter of Fig. 6 can be filters 505, 509, 515 and 517 (see col. 7, lines 42-43) and can be used in the branching filter a.k.a. duplexer 503 (see col. 7, lines 51-52).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hickernell U.S. 6,201,457 in view of Wadaka et al. U.S. 5,789,845.

Hickernell discloses the invention as discussed above, except for disclosing SAW resonators rather than piezoelectric thin film resonators.

Wadaka et al. discloses that it is well known in the acoustic resonator filter art that SAW resonators and piezoelectric thin film resonators that are bulk acoustic wave

resonators are art recognized equivalent acoustic resonators (see col. 1, lines 38-41) and shows the structure of such resonators over a recess or opening in a substrate (see e.g. Figs. 2 and 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the ladder filter of Hickernell (Fig. 6) by substituting piezoelectric thin film resonators in place of the SAW resonators, because such an obvious modification would have been the mere substitution of art recognized electrical equivalent acoustic resonators, as suggested by Wadaka et al. (see col. 1, lines 38-41), and as would have been known by one of ordinary skill in the art.

Allowable Subject Matter

7. Claims 2-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ella U.S. 6,081,171 discloses a piezoelectric thin film resonator filter having inductors in parallel with series resonators (Figs. 16a and 17a), and the inductors inside a package (Fig. 20a and 20b) of the filter.

Kommrusch U.S. 5,933,062 shows a SAW ladder filter (Fig. 3) with inductors in parallel with some resonators (Fig. 4) to provide wider bandwidths by increasing the

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separation between f_s and f_a (see col. 5, lines 4-9), and an inductor does not have to be coupled in parallel to all of the series resonators (see col. 6, lines 41-45).

Taniguchi U.S. 2003/0214368 shares the same Applicant and shows an inductor coupled in parallel with a first series arm resonator in ladder filters of a branching filter.

Yamamoto et al. U.S. 2004/0058664 discloses a ladder filter with an inductor connected in parallel with a first series arm resonator (see Fig. 5).

Omote U.S. 2004/0119561 discloses a ladder filter with an inductor connected in parallel with the series arm resonator (see Fig. 2) and the resonators being either SAW resonators (Fig. 3) or piezoelectric thin film resonators (Figs. 42 and 43).

Nishimura et al. U.S. 2004/0130410 discloses a branching filter with one filter having an inductor connected in parallel with two series arm resonators (see Fig. 8).

Sakuragawa et al. JP 2003-69382 discloses a SAW ladder filter (Fig. 1) with an inductor connected in parallel with the series arm resonators.

Nagatsuka et al. JP 6-260876 discloses a SAW ladder filter (Fig. 17) having inductors connected in various locations including in parallel with both series resonators.

The Seabury et al. article discloses a piezoelectric thin film resonator single stage ladder filter having an inductor formed on the same substrate and connected in parallel to the series resonator that is divided into two resonators (Fig. 8).

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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April 13, 2005



**BARBARA SUMMONS
PRIMARY EXAMINER**